

## 12V PNP SILICON LOW SATURATION SWITCHING TRANSISTOR AND SCHOTTKY DIODE

### SUMMARY

**Transistor:**  $V_{CE0} = -12V$ ,  $I_C = -1.25A$

**Schottky Diode:**  $V_R = 40V$ ;  $I_C = 0.5A$

### DESCRIPTION

A PNP transistor and a Schottky Barrier diode contained in a single 6 leaded SOT23 package.

### FEATURES

- Low Saturation Transistor
- High Gain - 300 minimum
- Low  $V_F$ , fast switching Schottky

### APPLICATIONS

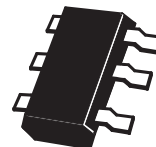
- Mobile telecomms, PCMCIA & SCSI
- DC-DC Conversion

### ORDERING INFORMATION

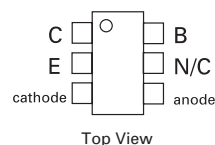
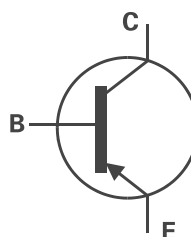
| DEVICE       | REEL SIZE (inches) | TAPE WIDTH (mm) | QUANTITY PER REEL |
|--------------|--------------------|-----------------|-------------------|
| ZXTS1000E6TA | 7                  | 8mm embossed    | 3000 units        |
| ZXTS1000E6TC | 13                 | 8mm embossed    | 10000 units       |

### DEVICE MARKING

1000



**SOT23-6**



# ZXTS1000E6

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                                                     | SYMBOL    | VALUE          | UNIT       |
|-------------------------------------------------------------------------------|-----------|----------------|------------|
| <b>Transistor</b>                                                             |           |                |            |
| Collector-Base Voltage                                                        | $V_{CBO}$ | -12            | V          |
| Collector-Emitter Voltage                                                     | $V_{CEO}$ | -12            | V          |
| Emitter-Base Voltage                                                          | $V_{EBO}$ | -5             | V          |
| Continuous Collector Current                                                  | $I_C$     | -1.25          | A          |
| <b>Schottky Diode</b>                                                         |           |                |            |
| Continuous Reverse Voltage                                                    | $V_R$     | 40             | V          |
| Forward Current                                                               | $I_F$     | 0.5            | A          |
| Non Repetitive Forward Current $t \leq 100\mu s$<br>$t \leq 10ms$             | $I_{FSM}$ | 6.75<br>3      | A<br>A     |
| <b>Package</b>                                                                |           |                |            |
| Power Dissipation at $T_{amb}=25^\circ C$<br>single die "on"<br>both die "on" | $P_D$     | 0.725<br>0.885 | W<br>W     |
| Storage Temperature Range                                                     | $T_{stg}$ | -55 to +150    | $^\circ C$ |
| Junction Temperature                                                          | $T_j$     | 125            | $^\circ C$ |

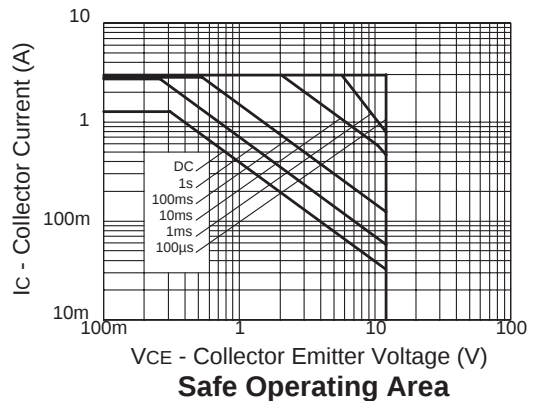
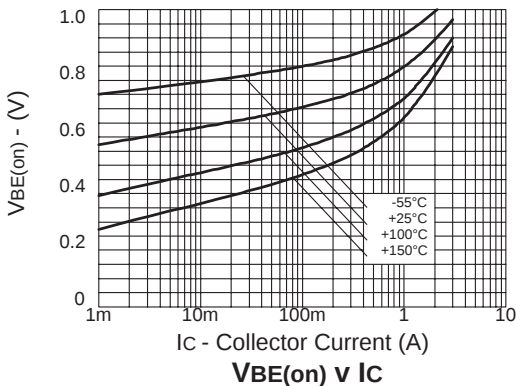
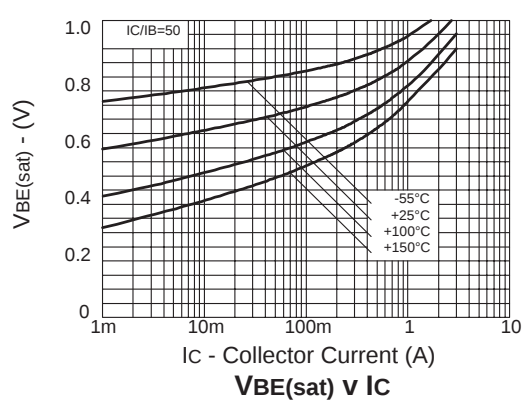
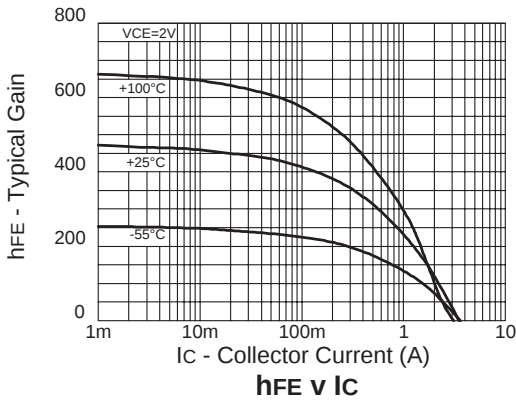
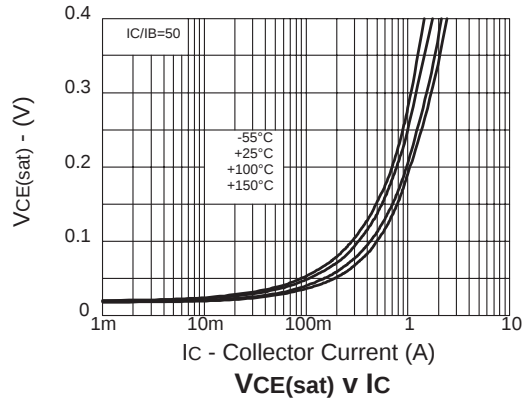
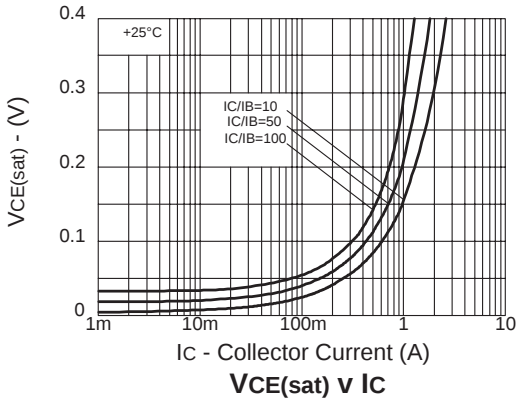
## THERMAL RESISTANCE

| PARAMETER                                                   | SYMBOL                             | VALUE      | UNIT                         |
|-------------------------------------------------------------|------------------------------------|------------|------------------------------|
| Junction to Ambient (a)<br>single die "on"<br>both die "on" | $R_{\theta JA}$<br>$R_{\theta JA}$ | 138<br>113 | $^\circ C/W$<br>$^\circ C/W$ |

### NOTES

(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

## TRANSISTOR TYPICAL CHARACTERISTICS



# ZXTS1000E6

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

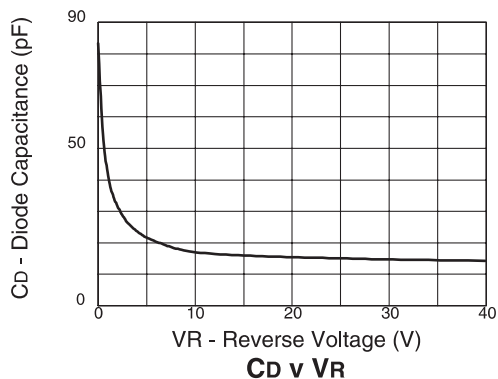
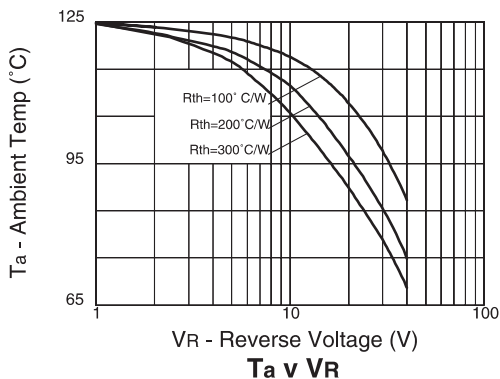
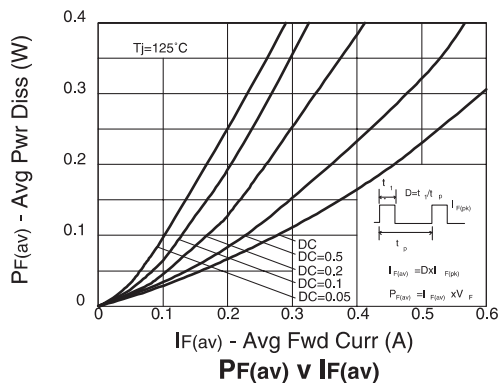
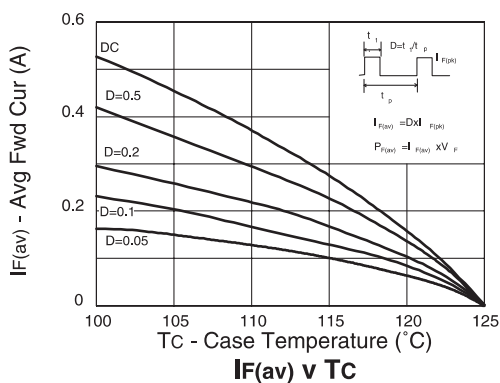
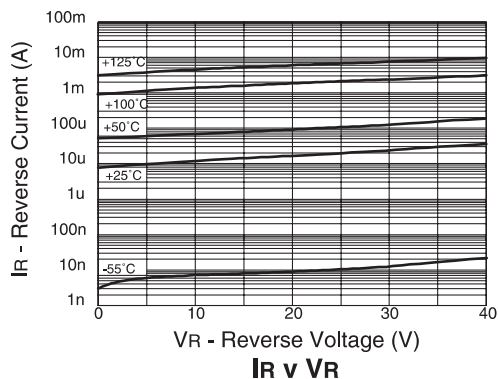
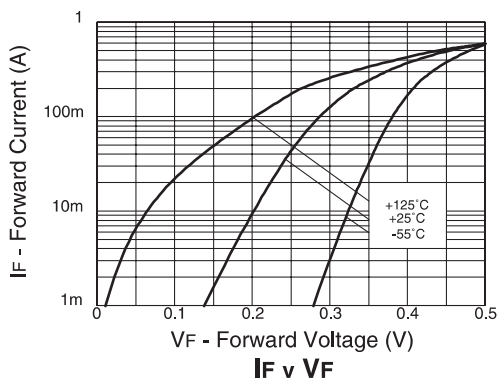
| PARAMETER                                    | SYMBOL        | MIN.                                 | TYP.                                  | MAX.                                | UNIT                       | CONDITIONS.                                                                                                                                                                                                                                                                         |
|----------------------------------------------|---------------|--------------------------------------|---------------------------------------|-------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TRANSISTOR ELECTRICAL CHARACTERISTICS</b> |               |                                      |                                       |                                     |                            |                                                                                                                                                                                                                                                                                     |
| Collector-Base Breakdown Voltage             | $V_{(BR)CBO}$ | -12                                  |                                       |                                     | V                          | $I_C = -100\mu\text{A}$                                                                                                                                                                                                                                                             |
| Collector-Emitter Breakdown Voltage          | $V_{(BR)CEO}$ | -12                                  |                                       |                                     | V                          | $I_C = -10\text{mA}^*$                                                                                                                                                                                                                                                              |
| Emitter-Base Breakdown Voltage               | $V_{(BR)EBO}$ | -5                                   |                                       |                                     | V                          | $I_E = -100\mu\text{A}$                                                                                                                                                                                                                                                             |
| Collector Cut-Off Current                    | $I_{CBO}$     |                                      |                                       | -10                                 | nA                         | $V_{CB} = -10\text{V}$                                                                                                                                                                                                                                                              |
| Emitter Cut-Off Current                      | $I_{EBO}$     |                                      |                                       | -10                                 | nA                         | $V_{EB} = -4\text{V}$                                                                                                                                                                                                                                                               |
| Collector Emitter Cut-Off Current            | $I_{CES}$     |                                      |                                       | -10                                 | nA                         | $V_{CES} = -10\text{V}$                                                                                                                                                                                                                                                             |
| Collector-Emitter Saturation Voltage         | $V_{CE(sat)}$ |                                      | -25<br>-55<br>-110<br>-160<br>-185    | -40<br>-100<br>-175<br>-215<br>-240 | mV<br>mV<br>mV<br>mV<br>mV | $I_C = -0.1\text{A}, I_B = -10\text{mA}^*$<br>$I_C = -0.25\text{A}, I_B = -10\text{mA}^*$<br>$I_C = -0.5\text{A}, I_B = -10\text{mA}^*$<br>$I_C = -1\text{A}, I_B = -50\text{mA}^*$<br>$I_C = -1.25\text{A}, I_B = -100\text{mA}^*$                                                 |
| Base-Emitter Saturation Voltage              | $V_{BE(sat)}$ |                                      | -990                                  | -1100                               | mV                         | $I_C = -1.25\text{A}, I_B = -100\text{mA}^*$                                                                                                                                                                                                                                        |
| Base-Emitter Turn-On Voltage                 | $V_{BE(on)}$  |                                      | -850                                  | -1000                               | mV                         | $I_C = -1.25\text{A}, V_{CE} = 2\text{V}^*$                                                                                                                                                                                                                                         |
| Static Forward Current Transfer Ratio        | $h_{FE}$      | 300<br>300<br>200<br>125<br>75<br>30 | 490<br>450<br>340<br>250<br>140<br>80 |                                     |                            | $I_C = -10\text{mA}, V_{CE} = -2\text{V}^*$<br>$I_C = -0.1\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -0.5\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -1.25\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -2\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -3\text{A}, V_{CE} = -2\text{V}^*$ |
| Transition Frequency                         | $f_T$         |                                      | 220                                   |                                     | MHz                        | $I_C = -50\text{mA}, V_{CE} = -10\text{V}$<br>$f = 100\text{MHz}$                                                                                                                                                                                                                   |
| Output Capacitance                           | $C_{obo}$     |                                      | 15                                    |                                     | pF                         | $V_{CB} = -10\text{V}, f = 1\text{MHz}$                                                                                                                                                                                                                                             |
| Turn-On Time                                 | $t_{(on)}$    |                                      | 50                                    |                                     | ns                         | $V_{CC} = -10\text{V}, I_C = -1\text{A}$<br>$I_{B1} = I_{B2} = -100\text{mA}$                                                                                                                                                                                                       |
| Turn-Off Time                                | $t_{(off)}$   |                                      | 135                                   |                                     | ns                         |                                                                                                                                                                                                                                                                                     |

## SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS

|                           |             |    |                                               |                                                |                                        |                                                                                                                                                                                     |
|---------------------------|-------------|----|-----------------------------------------------|------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reverse Breakdown Voltage | $V_{(BR)R}$ | 40 | 60                                            |                                                | V                                      | $I_R = 200\mu\text{A}$                                                                                                                                                              |
| Forward Voltage           | $V_F$       |    | 270<br>300<br>370<br>425<br>550<br>640<br>810 | 300<br>350<br>460<br>550<br>670<br>780<br>1050 | mV<br>mV<br>mV<br>mV<br>mV<br>mV<br>mV | $I_F = 50\text{mA}^*$<br>$I_F = 100\text{mA}^*$<br>$I_F = 250\text{mA}^*$<br>$I_F = 500\text{mA}^*$<br>$I_F = 750\text{mA}^*$<br>$I_F = 1000\text{mA}^*$<br>$I_F = 1500\text{mA}^*$ |
| Reverse Current           | $I_R$       |    | 15                                            | 40                                             | $\mu\text{A}$                          | $V_R = 30\text{V}$                                                                                                                                                                  |
| Diode Capacitance         | $C_D$       |    | 20                                            |                                                | pF                                     | $f = 1\text{MHz}, V_R = 30\text{V}$                                                                                                                                                 |
| Reverse Recovery Time     | $t_{rr}$    |    | 10                                            |                                                | ns                                     | switched from<br>$I_F = 500\text{mA}$ to $I_R = 500\text{mA}$<br>Measured at $I_R = 50\text{mA}$                                                                                    |

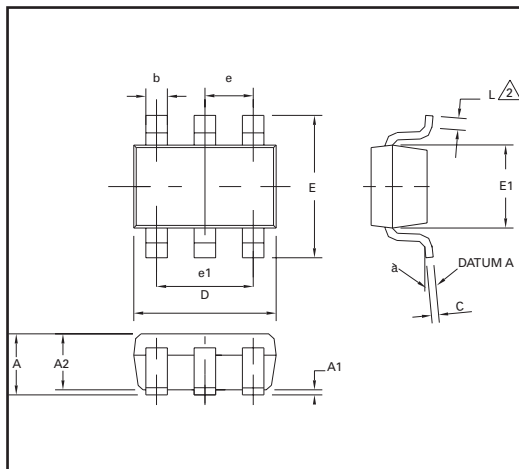
\*Measured under pulsed conditions.

## DIODE TYPICAL CHARACTERISTICS

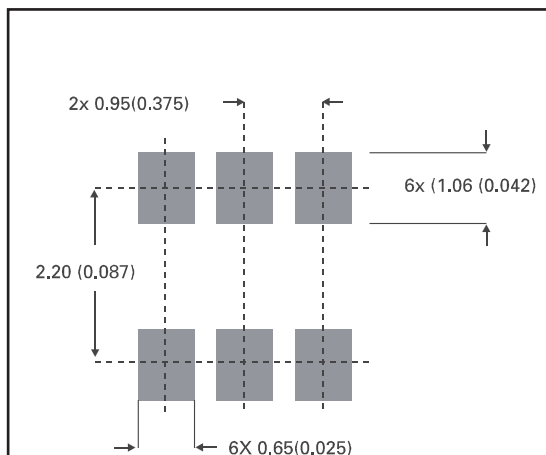


# ZXTS1000E6

## PACKAGE DIMENSIONS



## PAD LAYOUT DETAILS



| DIM | Millimetres |      | Inches    |       |
|-----|-------------|------|-----------|-------|
|     | Min         | Max  | Min       | Max   |
| A   | 0.90        | 1.45 | 0.35      | 0.057 |
| A1  | 0.00        | 0.15 | 0         | 0.006 |
| A2  | 0.90        | 1.30 | 0.035     | 0.051 |
| b   | 0.35        | 0.50 | 0.014     | 0.019 |
| C   | 0.09        | 0.20 | 0.0035    | 0.008 |
| D   | 2.80        | 3.00 | 0.110     | 0.118 |
| E   | 2.60        | 3.00 | 0.102     | 0.118 |
| E1  | 1.50        | 1.75 | 0.059     | 0.069 |
| L   | 0.10        | 0.60 | 0.004     | 0.002 |
| e   | 0.95 REF    |      | 0.037 REF |       |
| e1  | 1.90 REF    |      | 0.074 REF |       |
| L   | 0°          | 10°  | 0°        | 10°   |



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